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ABSTRACT

This paper presents the results and implications of a quantitative and qualitative investigation into the information literacy of college faculty members who did or did not receive instruction at the Main Campus of New Mexico State University and two of its branch community colleges. Of several factors that were suspected to relate to faculty information literacy, only frequency of visits to the library, comfort with computers, comfort with the library, and self-assessment of overall library research competence were found to have statistically significant relationships with information literacy. In general, faculty demonstrated strong competence in information literacy. The paper discusses elements of faculty culture documented in the literature and substantiated in the study. These elements may inhibit faculty from developing students' information literacy and from enhancing their own. The paper recommends ways for librarians and faculty to collaborate, in order to foster information literacy in themselves and in students. (Contains 28 references.) (Author/AEF)

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INVESTIGATING AND IMPROVING THE INFORMATION LITERACY OF COLLEGE FACULTY

BY

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Abstract

This paper presents the results and implications of a quantitative and qualitative investigation into the information literacy of college faculty members who did or did not receive instruction at the Main Campus of New Mexico State University and two of its branch community colleges. Of several factors suspected to relate to faculty information literacy, only frequency of visits to the library, comfort with computers, comfort with the library, and self-assessment of overall library research competence were found to have statistically significant relationships with information literacy. In general, faculty demonstrated strong competence in information literacy. The paper discusses elements of faculty culture documented in the literature and substantiated in this study. These elements may inhibit faculty both from developing students' information literacy and from enhancing their own. The paper recommends ways for librarians and faculty to collaborate, in order to foster information literacy in themselves and in students.

Investigating and Improving the Information Literacy of College Faculty

Introduction

A recent Google (http://www.google.com) search for "information-based society" and "information worker" resulted in hits originating from Korea, Canada, Finland, and many other countries, but few from the United States. Despite the fact that the US sets the standard for information management activities, it appears we do not focus on the importance of preparing our students to compete in today's information-driven society. This attitude stands in stark contrast to the fact that 60% of our GNP revolves around information (Dertouzos, 1997). The consequences of higher education not preparing its graduates to manage information effectively for personal and professional purposes could be enormous (Stoffle, 1998). The goal in information literacy initiatives on college campuses should be to provide students and faculty with a broad spectrum of activities to nurture lifelong independent learners who can teach themselves and solve problems.

Three distinct cultures influence the implementation of information literacy on higher education campuses, those of the administration, library, and faculty (Iannuzzi, 1998). To the extent that these three groups align their thinking and actions in support of effective information-literacy instruction, students will have opportunities to develop their ability to find, analyze, and use information effectively (ALA, 1989).

Administrators set the tone by ensuring that information literacy objectives are included in mission statements and strategic plans. They create opportunities

for librarians and faculty to collaborate by allocating resources, constructing reward systems, and facilitating staff development efforts. Success in the campus-wide implementation of information literacy initiatives is unlikely without the firm support of administration. If administrators cultivate information literacy efforts, others on campus are more likely to support those efforts as well (MacDonald, Rathemacher, & Burkhardt, 2000).

Librarians spearhead information literacy efforts on college campuses. Librarians recognize that with the proliferation of information sources available on the Internet and in electronic databases, students need training, support, and practice to find and evaluate information sources for any type of information need represented by the research project in college courses. They look for collaborative opportunities with individual faculty, departments, programs, and committees. They provide the technological, system, and instructional expertise to empower students to manage information effectively. Baker's (1997) survey of community college faculty indicated faculty members value the role of librarians in teaching information seeking as "educational partners" (p. 182) perhaps more than librarians do. The challenge for librarians is to find ways to gain support for their views from the other two cultures.

Literature Review

This paper focuses on faculty culture and reports on the state of faculty information literacy at three campuses of a Southwestern land-grant institution, faculty attitudes toward student and faculty information literacy, and techniques to improve faculty literacy. Past investigations relevant to this research covered

how faculty members view their own roles with regard to student information literacy, the roles of their students, and the roles of librarians. The literature review addresses past research pertaining to the following questions:

1. How do faculty believe students should develop information literacy?
2. How do faculty perceive the roles of academic librarians?
3. Do faculty grasp the complexity of the task of fostering student information literacy? Have they forgotten what it is like to be a novice researcher?
4. Have faculty kept pace with the complexity of doing research in electronic environments?
5. What is the future of information literacy for faculty and students?

Faculty Roles in Fostering Student Information Literacy

Do Faculty Believe they should Foster Student Information Literacy?

Faculty members control class content, assignments, and learning objectives. Faculty members serve as role models, facilitators, and mentors for their students. College faculty members are a significant link in the process of educating students to become information literate (Cannon, 1994) and bear a responsibility to students to provide them with opportunities to improve information literacy skills (Amstutz & Whitson, 1997). Faculty members are the key to whether or not students practice and develop their information literacy skills.

Many college faculty members recognize the value of giving students assignments that require them to locate, evaluate, and synthesize information from both the library and Internet as a critical thinking exercise within general and

discipline-specific courses (Sellen & Jirouch, 1984). These faculty members may have designed an assignment long ago or created a new exercise to familiarize students with websites or other resources relevant to a particular discipline (Baker, 1997). They may also have worked closely with librarians to update or design effective assignments. However, Baker found only 8% of faculty members at Pima Community College were known by library staff to be making library assignments. Several researchers (Hall, 1999; Mosley, 1998) noted the problem of faculty not updating library assignments and of giving inaccurate information.

Some faculty members schedule an instructional session each semester in the library (Hall, 1999). However, a majority of students in the Sellen & Jirouch (1984) study reported they did not receive a library orientation, so it appears that faculty were not providing opportunities for students to develop a core of knowledge about library resources. In an article in *Change*, Green and Gilbert (1995) encouraged student use of libraries to help students become familiar with the literature of the discipline under study, to develop communication skills, and to foster intellectual growth, but not to develop general information management skills.

Only a few surveys were conducted in the past that were specifically designed to assess faculty attitudes toward library research instruction. Cannon (1994) summarized these findings: "that faculty were not happy with the level of their students' library research skills; that they recognized the need for library research instruction but did not care to provide it themselves; and that faculty did not make heavy use of librarians to provide this instruction for their classes" (p.

525). In Maynard's (1990) study of faculty at The Citadel, only 17% of respondents thought faculty should provide library instruction themselves.

According to Mullins and Park's (2000) survey of 55 University of Memphis faculty members, 82% believed students should learn to conduct library research from both faculty members and librarians. A 1995 study at the University of Wyoming (Amstutz & Whitson, 1997) indicated 53% of 309 faculty felt faculty members are significant a factor in helping students develop information management skills and 45% felt librarians were important in the process.

Do Faculty Believe Students Should Gain Competency on Their Own?

Some faculty believe students already possess the skills they need or they will pick them up on their own by asking questions or through trial or error (Thomas, 1994). These findings held in studies conducted by Thomas in both 1984 and 1990. In 1990, 18% of respondents—in contrast to the 6% who expressed a similar attitude in the 1982 study—had "no idea how their students learned to use the library and felt no responsibility to teach them" (p. 216). In Amstutz and Whitson's (1997) study of faculty information acquisition, 64% of the 309 respondents held students responsible for developing their own information management skills. Thomas calls this attitude in a California post-secondary institution "disturbing" (p. 216) as she notes that California is dead last among the states in support of public school libraries and thus is unlikely to provide students sufficient information literacy before they get to the university.

Do Faculty Believe Students Should Gain Competency from Someone Other than Faculty?

Other faculty members may not agree that information literacy deserves a primary place in their courses. They may find their curriculum too full to dedicate time for library instruction (Thomas, 1994). They may begrudge spending valuable class time for what they perceive as process training only tangentially related to the subject matter they must communicate to students.

For many faculty members, their commitment is to their discipline rather than the institution or the students. Their job and passion is to bring more trained individuals into their chosen field, to instill a love of a career or discipline, or to convey the subject material (Hardesty, 1991). They would teach the same subjects regardless of institutional affiliation or which students signed up for their courses. They want to spend the time they have with students transmitting the core of knowledge in that subject (Breivik, 1998). They may not appreciate the gradual accumulation of competency in research and information management or the need for students to practice and develop these skills over time in a variety of courses. Baker (1997) found that community college faculty members who design library assignments want to familiarize students with the literature of the discipline.

Faculty members who learned to use a library by trial and error are likely to expect their students to learn without formal instruction (Cannon, 1994). Faculty interviewed by Hardesty (1991) had not reflected on student use of the library. Hardesty (1995) observed faculty have not embraced bibliographic

instruction. They may not believe library assignments lead to improved performance and increased student learning.

How do Faculty Perceive the Roles of Academic Librarians?

Hardesty (1995) referred to the resistance of many faculty members to inviting librarians into their classrooms to provide instruction as faculty "recalcitrance." Some faculty members feel a loss of control over their domain, so firmly instilled through the concept of academic freedom, if they permit a librarian to take over their classroom even for 50 minutes.

The perception of the librarian as a professional, but not an equal, is another barrier to cooperation between librarians and college faculty. Ivey (1994) found faculty did not think of librarians as academics, but did value their contributions.

On the other hand, in Cannon's (1994) study of 209 faculty members, half of the respondents believed instruction should come from both faculty and librarians while 43% felt that if only one of the two could provide the instruction, then it should be the librarian. Cannon reported that faculty members who had experienced positive personal interactions with the library, who had received previous training in library use, and who visited the library frequently were more likely to consider information literacy important for their students and to include library assignments in their courses.

Do Faculty Grasp the Complexity of the Task of Fostering Student Information Literacy? Have They Forgotten What it is Like to be a Novice Researcher?

Some faculty members believe the brief sessions provided by librarians in introductory English courses provide all the foundation students require to competently conduct research for college papers (Hardesty, 1991; Thomas, 1994). Although the assignment appears reasonable to an expert researcher, it may be overwhelming to a novice (Leckie, 1996). Students and librarians become frustrated when trying to figure out what the faculty member intended if prior contact did not occur between the library and the faculty member.

Faculty as Expert Researchers

A significant obstacle to faculty success in designing assignments and scenarios to improve student research skills is the fact that faculty and students use different research processes. Through their lengthy "acculturation" (p. 201) process (Leckie, 1996), faculty members have learned the basic sources, and have come to recognize authors, tools, contacts, and publications from which they obtain required information relevant to their subject area. Leckie calls faculty members "expert researchers" (p. 201). Faculty members follow citation trails to locate valuable materials, by tracking the references at the end of relevant articles located in current journals obtained from their personal subscriptions, colleagues, the department, or the library. They may only rarely conduct a subject search in the library catalog or a database. They use both formal and informal information gathering techniques (Hart, 1997).

Since faculty members have developed one or more highly specialized areas, they make heavy use of personal contacts and the invisible college, a loose network of scholars working in academe who support one another, to gather new information. They maintain an extensive personal library of sources related to their research interests. They know at least some of the researchers in their field personally. They are sophisticated, independent library users who require little assistance from library staff to find what they need. They may be self-taught with technology or resist it entirely, but still be able to cope with the research process on their own. They may not visualize research as a process.

Students as Novice Researchers

In contrast, students know little about the structure of information, the research process, the specific library setting, the individual tools to use, what constitutes a scholarly source, and most important, the topic they must research. To students, the subject, the library, and the research process are all new. Since the topic is unknown to them, students may not know the key authors writing on the subject, the vocabulary to use as subjects and keywords, the journals likely to contain relevant articles, or the databases where they should look for appropriate sources.

Sellen and Jirouch (1984) found a significant discrepancy between the library sources students reported using in their research and those faculty expected them to use. Students used encyclopedias and dictionaries; whereas, faculty thought these resources were too rudimentary for college level work. Students also relied more heavily on books and less on articles than faculty

expected. The different research processes of faculty and students could account for the difference between faculty perceptions and the reality of what students need and use.

The college library is much larger and more confusing than the public or high school library students learned to use in the past. Current library technology provides a dizzying array of systems, databases, search techniques, library services, output formats, and types of citations. The myriad ways information is organized and accessed may be overwhelming for new students. The information-seeking process is extremely confusing and unpredictable to the uninitiated. Students may simply see the research project for a course as something to get through as painlessly as possible. They may not be aware of the fact that they will have to find relevant and authoritative information repeatedly in subsequent semesters and later life.

The idea that library lessons need to be stored for future reference rarely occurs to freshman students. Consequently, the student research process is fraught with confusion, frustration, and frequent failure (Kuhlthau, 1988). Students may also have procrastinated, adding that time-pressure element with which busy faculty members are so familiar. Finally, some students are reluctant to ask questions in a library and strive to conceal their lack of knowledge of how to conduct library research (Mullins & Park, 2000). Yet, 68% of faculty who responded to Mullins and Park's survey believed (and depended on the fact) that students would ask for help when doing research.

Have Faculty Kept Pace with the Complexity of Doing Research in Electronic Environments?

According to Amstutz and Whitson (1997), faculty members need to become information literate. Yet, minimal research has investigated the extent to which they possess information management skills. Faculty members are most confident in acquiring information with the techniques they learned during their graduate education (Amstutz & Whitson). If they received their degree before the arrival of full-text electronic databases, online journals, and the Internet, it is possible they have not kept pace with the changes that technology has brought to the organization of and access to the literature of most disciplines. Since bibliographic instruction and research methods courses have become popular only in the last 20 years, they may have learned to use the library by trial and error (Hall, 1999). Even if the faculty member did update his or her skills within the last few years, technology and the Internet continue to transform the research world every few months. Database names change, new products and technologies appear, once free products become expensive subscription services or vice versa, and new websites appear to facilitate access to formerly unreachable materials.

Research faculty members are more likely to use electronic tools and to provide research instruction for their students (Cannon, 1994) than teaching faculty. Faculty members who spend all their time teaching may quickly become out of touch with technological changes in the organization of and access to

scholarly literature and other information sources. Yet, they mentor and grade more student work than faculty who are spending most of their time researching.

The isolation and autonomy of the professorate and the constant time pressure to juggle teaching, research, and service responsibilities may cause some faculty members to fail to keep up with technology. There is risk in spending time learning a new technology when it may disappear quickly or not improve their teaching or research. Faculty members may hide the fact that they have not kept up with innovations as a face saving tactic. The complexity and constant change of the information arena today may overwhelm faculty members (Amstutz & Whitson, 1997).

What is the Future of Information Literacy for Faculty and Students?

Librarians worry when some faculty members refuse to permit their students to use electronic versions of scholarly articles or anything from the Internet as documentation in a paper or project. The justification for this decision may be the quest to save time by keeping student knowledge within the faculty member's sphere of knowledge (Breivik, 1998). Each time a student researches a new topic, the faculty member must review the sources and become knowledgeable on the topic to be ready to identify plagiarism and detect thinking errors. However, eliminating Internet sources is no longer possible. Internet-based access may be the most convenient or the only way to obtain many materials. Now most academic and large public libraries subscribe via the Internet to scholarly journals and databases that contain indexing and full-text

versions of materials they formerly received in print. If students do not use the library website, they will miss valuable, high quality materials.

Methodology

The purpose of this study was to collect both quantitative and qualitative data from college faculty on their information literacy and their attitudes toward both faculty and student information literacy. The following research questions guided the project:

1. What are faculty attitudes toward student competence in information literacy?
2. Are any of the following (self-reported) variables related to faculty information-literacy: (a) Instructional interventions (a faculty technology training program, library research instruction, or Internet instruction), (b) number of years of university teaching experience, (c) frequency of visits to the library, (d) amount of reading for pleasure, (e) number of access points to the Internet, (f) overall knowledge of how to conduct library research, (g) comfort with computers, or (h) comfort with the library?
3. How do faculty members approach finding information on a topic outside their field?
4. What do faculty believe about how faculty should learn and maintain their information literacy skills?

One hundred eight faculty members from three campuses of New Mexico State University responded to a 42-question, web-based test and attitude survey during September and October of 2000. The first 21 questions formed an objective measure of information literacy that was developed over a 2-year

period to measure student information literacy. Subscribers to the BI-L (Bibliographic Instruction) listserv (bi-l@listserv.byu.edu) suggested improvements and clarifications to the instrument in August 2000. During late August 2000, a pilot study was conducted of faculty at institutions whose librarians found out about the test through the BI-L listserv.

Eleven questions collected demographic information and nine questions assessed attitudes regarding information literacy instruction for both faculty and students. The final question asked participants the steps they would take to find information on the topic of body piercing. This question was selected because it fell outside the interests of most faculty members and required them to approach a research project as a novice rather than an expert.

Email messages and announcements were sent to the following groups to request their participation in the study: alumni of the Institute for Technology-Assisted Learning (ITAL) program (described below), subscribers to the NMSU educational technology listserv, faculty whose department head forwarded the email from the NMSU administrative listserv, faculty who attended library workshops at any campus during the semester, and faculty on NMSU campuses whose librarians forwarded correspondence about the project to request their participation in the project. Readers may access the version of the instrument designed for the ITAL alumni at: http://personal.lig.bellsouth.net/lig/a/n/annemoor/ital.html. The version for other faculty is located at: http://personal.lig.bellsouth.net/lig/a/n/annemoor/nfacili.html.

Table 1. Faculty Information Literacy Instrument and Results.

ITAL Faculty Information Literacy Instrument and Attitude Survey

Please complete and submit the Consent to Participate before taking this survey.
Please complete the following questions to the best of your knowledge. Click the Submit Form button at the bottom of this page when you are finished. Your comments will be anonymous.
Special Note: In Questions 1-21 the terms "research paper" and "term paper" refer to lower-level undergraduate research, not specialized or graduate research.

1. Circle the most accurate statement:
   a. All information is available on the Internet.
   b. The Internet contains a mix of information of varying quality.
   c. The Internet contains mainly popular information sources.
   d. The Internet contains nothing of value.

2. Which of the following would not be considered a primary source?
   a. a speech
   b. an autobiography
   c. a textbook
   d. a television interview

3. The service offered in most public and academic libraries that allows you to get almost any publication you need is called:
   a. reserves
   b. reference
   c. interlibrary loan
   d. full-text

4. Items in great demand (often placed on faculty reading lists) that are available for limited loan periods in a special section of the library are:
   a. microfilm material
   b. newspaper material
   c. reference material
   d. reserve material

5. A place in a library staffed by someone who answers questions and provides help in using the library, conducting research, and locating information is:
   a. a reference desk
   b. a periodicals room
   c. a computer lab

6. A short paragraph that describes the scope, focus, and value of an item is:
   a. an article
   b. a citation
   c. an annotation
   d. a footnote

7. Books kept in a college library are now normally located through:
   a. the card catalog
   b. periodical indexes
   c. a printed list updated each month
   d. the online library catalog

8. It is often advisable to begin research for an term paper in what section of the library?
   a. circulating books
   b. journals and periodicals
   c. reserve collection
   d. reference collection

9. When selecting materials for research papers from the Internet, which criterion is least important?
   a. currency
   b. authority
   c. frequency

d. objectivity
e. accuracy

10. Anything you find on the Internet is yours for the taking.
a. true
b. false

11. When performing a search with an Internet search engine or online database, which will bring up the most items?
a. gun OR control
b. gun AND control
c. gun NOT control

12. When evaluating web pages for possible use in research papers, students should be most cautious of those from which domain?
a. .org
b. .com
c. .gov
d. .edu

13. Which of these is not a type of Internet search tool?
a. browser (e.g., Microsoft Internet Explorer)
b. meta search engine (e.g., Dogpile)
c. search engine (e.g., Altavista)
d. subject directory (e.g., Yahoo)

14. Which of the following Internet search structures is correct when looking for web sites on drunk driving in New Mexico?
a. "drunk driving"+ "New Mexico"+
b. +"drunk driving" +"New Mexico"
c. + drunk driving + New Mexico
d. "+drunk driving +New Mexico"

15. Which would you normally not find listed in a library catalog?
a. a video
b. a book
c. an article
d. a government document

16. Which of the following citations describes a journal article?
a. *Doctor Zhivago*. New York: MGM/UA Home Video, c1988.
b. Mitchell, T. R. (1987). *People in organizations: An introduction to organizational behavior* (3rd ed.). New York: McGraw-Hill.
c. Coltheart, M., & Curtis, B. (1993). Models of reading aloud. *Psychological Review, 100*(2), 589-599.
d. American Library Association, Presidential Committee on Information Literacy. (1989). *Final report*. Retrieved on April 15, 2000 from the World Wide Web: http://www.ala.org/acrl/nili/ilit1st.html.

17. Articles from which one of the following periodicals are consistently appropriate for use in a research paper?
a. *Science*
b. *Redbook*
c. *Atlantic Monthly*
d. *Newsweek*
e. *Psychology Today*

18. Research papers should not ordinarily include articles from which of these sources?
a. newspapers
b. scholarly journals
c. peer-reviewed journals
d. popular magazines

19. The term to describe a list of books, articles, web pages and other materials that have some relationship to each other is:
   a. an autobiography
   b. a bibliography
   c. a biography
   d. a footnote

20. A summary of the contents of an article, book, web page, or other item is:
   a. an abstract
   b. an index
   c a pamphlet
   d. a periodical

21. Which of the following is not an appropriate step in writing a research paper?
   a. evaluating each resource obtained for relevance to the topic
   b. narrowing the topic
   c. basing the paper on the first sources that came up when searching the topic in the library databases
   d. revising the first draft for grammatical, formatting, and organizational problems

Background and Personal Information (Click on your answer)

22. When did you participate in the ITAL program?

Faculty Received Formal IL Training	Frequency	Percentage
Confirmed	14	13%
Other	94	87%

23. What is your gender? See Table 2.
   a. male
   b. female

24. What is your teaching category? See Table 2.
   a. full-time
   b. adjunct

25. How many years have you been teaching? See Table 2.

26. What types of courses do you teach? See Table 2.
   a. humanities
   b. social sciences
   c. mathematics or sciences
   d. vocational or technical
   e. other

27. How frequently do you schedule a library instruction session with library staff?

Faculty Schedule BI for Students	Frequency	Percentage
Always	11	10%
Usually	14	13%
Occasionally	45	42%
Never	37	35%

28. To what extent do you integrate library research requirements into your curriculum?

Students Receive IL Assignments	Frequency	Percentage
Always	32	30%
Frequently	31	29%
Sometimes	30	28%
Rarely	8	7%
Never	7	6%

29. How would you rate the overall information literacy level of your students? Information literacy is defined as the ability to locate, understand, interpret, evaluate, and communicate appropriate information for any need from appropriate sources.

IL level of students	Frequency	Percentage
High	7	7%
Medium	63	58%
Low	38	35%

30. Have you received formal library research instruction in the past five years?

Faculty Self-Identified Received Library Training	Frequency	Percentage
Yes	56	52%
No	52	48%

31. Have you had any formal instruction on researching on the Internet?

Faculty Self-Identified Received Internet Training	Frequency	Percentage
Yes	55	51%
No	53	49%

32. How often have you visited a library within the past year?

Faculty Library Visits	Frequency	Percentage
Daily	10	9%
Frequently	59	55%
Sometimes	29	27%
Rarely	8	7%
Never	2	2%

33. To what extent do you enjoy reading for pleasure?

Reading for Pleasure	Frequency	Percentage
Extremely	59	55%
Moderately	31	29%
Some	10	9%
A Little	7	7%
Not at all	0	0%

34. Do you have access to the Internet in the following locales?
1-5 places, work, school, public library, home, friend or relative's home

Access Points to Internet	Frequency	Percentage
4-5	30	28%
2-3	62	57%
0-1	16	15%

35. What is your comfort level with computers?

Perceived Computer Comfort	Frequency	Percentage
Expert	26	24%
Competent	77	71%
Fumble	5	5%

36. What is your comfort level with the college library?

Perceived College Library Comfort	Frequency	Percentage
Expert	16	15%
Competent	79	73%
Fumble	13	12%

37. Before you become frustrated, how often can you find what you need on the Internet?

Can Find Information on Internet without Frustration	Frequency	Percentage
Frequently	84	78%
Sometimes	22	20%
Rarely	2	2%

38. How would you assess your overall knowledge of how to conduct library research?

Overall ability to research	Frequency	Percentage

Excellent	31	29%
Good	57	53%
Fair	18	17%
Poor	2	2%

39. Should college students receive information literacy instruction?
a. If yes, how should this instruction be provided? See Table 4 for details.
b. If no, please explain

Student information literacy instruction	Frequency	Percentage
Yes	105	98%
No	2	2%

40. Should faculty be offered information literacy instruction?
a. If yes, how should this instruction be provided? See Table 6 for details.
b. If no, please explain

Should Faculty Receive IL Training	Frequency	Percentage
Yes	103	96%
No	4	4%

41. Please list up to ten steps you would take to find information on body piercing. See Table 5.

A total of 111 surveys were received. Three surveys submitted by non-teaching administrators were dropped, which left 108 for analysis. Demographics for the sample are summarized in Table 2. A posttest-only design with nonequivalent groups, which is pre-experimental, was selected (Campbell & Stanley, 1963). The justification for this decision was the difficulty of scheduling and getting faculty members to attend instructional sessions. Results from this research should not be generalized to other populations. The data were analyzed on SAS Version 8.0 for Microsoft Windows licensed by New Mexico State University.

The formal program attended by 13% of the respondents is called ITAL. Information literacy instruction takes up approximately four hours of the program. This instruction focuses on how to conduct academic research on the Internet and library services for students and faculty working from off-campus. The ITAL program is presented by the Scholarly Technology section of New Mexico State University's Computing & Networking Department. The NMSU Library, the

Center for Educational Development, and the Distance Education and Weekend College, as well as Computing & Networking, sponsor the program two or three times each year. During the intensive, weeklong sessions faculty learn to integrate technology into their teaching. Since its inception in 1997, the program has trained nearly 150 faculty members. The faculty member's department pays $1,000 per attendee. Each participant receives a laptop computer, software, technical support, email listserv, and follow-up workshops.

The survey also asked respondents to self-report on whether they had received library research instruction and Internet instruction. Completion of ITAL training would have been a more reliable indicator of information literacy training. However, since so few ITAL alumni completed the survey, the self-report items were used as additional independent variables.

Table 2. The Sample.

Characteristic	Categories	Percentages
Gender	Female	59%
	Male	41%
Teaching Category	Full-time	81%
	Adjunct	19%
Years Teaching	Average	12
	Span	0-32
Began Teaching	Pre-Internet	66%
	Post-Internet	34%
Field/Discipline	Social Sciences/Business	33%
	Vocational/Technical	20%
	Math/Science/Medicine	20%
	Humanities	14%
	Other	13%

Findings

The relationship between years of teaching and score on the information literacy test (r=.1984) was not significant according to a Product-moment correlation (Table 3). Characteristics of faculty members other than how long

they have been teaching must account for their information literacy. Faculty who embrace technology (sometimes referred to as adopters) may do so because they are drawn to it or they believe it is important for their discipline. They may be self-taught or have taken advantage of the enrichment opportunities presented.

Table 3. Impact of Instruction on Faculty Information Literacy Scores.

Score	Mean	*n*
Sample	n=108	108
Mean	17.66	
SD	2.1	
ITAL Participation		108
Yes	18.27	14
No	17.57	94
F-value *p*-value	1.40	.2389
Library Research Instruction		107
Yes	17.98	56
No	17.33	52
F-value *p*-value	2.66	.1055
Internet Instruction		108
Yes	17.71	55
No	17.62	53
F-value *p*-value	.05	.8318
Years of Teaching Correlation	.1876	108
Pre-Internet 9+ years	17.46	67
Post-Internet 0-8 years	18	41
F-value *p*-value	1.68	.1984

Even though only 13% of the sample had attended a formal program (ITAL) that included information literacy instruction, 52% of respondents said they had received library instruction and 51% said they had received instruction in the use of the Internet. Several ITAL alumni felt the ITAL program did not include "information literacy instruction" per se. Conversely, one respondent reported having taken web tutorials on information literacy. But none of the three categories of faculty training (ITAL, self-identified library research instruction, or self-identified Internet instruction) showed significantly improved scores on the information literacy test (Table 3).

When asked whether faculty should receive information literacy instruction, 96% said yes. When asked how they should receive this training, 36% of the respondents believed the workshop, seminar, and even short course methods were the most effective techniques. These could take many forms, but the consensus was to keep them less than 2 hours in length and focus on a particular topic or resource. Some respondents (18%) thought mandatory in-service or professional development opportunities were necessary. Another 9% felt sessions should be voluntary. One respondent thought adjunct faculty should earn compensation for attending workshops and technology seminars to encourage them to attend. In addition, 3% thought new faculty members should attend a formal orientation program for technology, computing, and libraries. Five percent favored information literacy updates at least annually. The provision of training specifically geared to the discipline or department appealed to 6% of respondents, but 11% preferred to schedule appointments with a librarian and have one-on-one attention.

Two faculty members had never considered the topic of training for faculty members in how to find and manage information effectively. Particularly dramatic comments came from three respondents who did not believe faculty members would accept training willingly. They said:

- *Good luck!*
- *Faculty resist all attempts at instruction—it is in their nature.*
- *It's hard to get us to take time out even though we should.*

These observations indicate that faculty culture and attitude still impede their mastery of new material and hamper faculty member's ability to keep up with technology and manage information in their discipline. The respondents suggested a variety of training methods that would be beneficial to faculty members (Table 7); however, attendance at sessions scheduled by the library is low.

Table 4 lists the analysis of variance results for the independent variables. Score on the information literacy instrument was the dependent variable. An analysis of variance (ANOVA df=4 F=2.62 p=0.0390) yielded significance when the score means were compared across the different frequencies of library visitation by faculty members in the sample. The Tukey Honestly Significant Difference (HSD) Test showed that the significant difference in test scores lay between faculty members who visited the library on a daily basis and those who visited the library rarely. Faculty members are heavy library users and those who visit the library frequently tend to be more information literate. The faculty members in the sample are also heavy readers (55% extremely frequent and 29% moderately frequent); however, the relationship between frequency of reading and information literacy score was not significant.

The study gathered information on the number of points or locations from which the faculty member could access the Internet. While 85% of the respondents had two or more places from which to access the Internet, easy and convenient access to the Internet did not relate significantly to information literacy score.

Table 4. Analysis of Variance Results for Independent Variables on Score.

Variable	*df*	*F*	*p-value*	Tukey HSD Contrast
Faculty ability to find information	2	2.46	.0901	
Faculty computer comfort	2	3.35	.0388	Competent>Fumble 2.44*
Faculty discipline or field	4	.61	.6571	
Faculty Internet access points	2	.21	.8130	
Faculty Internet instruction	1	.05	.8318	
Faculty information literacy instruction	2	2.66	.1055	
Faculty library comfort	2	7.01	.0014	Expert>Competent 2.78* Competent>Fumble 1.50*
Faculty library visits	4	2.62	.0390	Daily > Rarely 2.95*
Faculty overall library research assessment	3	6.35	.0005	Excellent > Fair 2.26* Good > Fair 1.55*
Faculty reading frequency	3	1.13	.3387	
Student assignments	4	.76	.5540	
Student information literacy	2	1.64	.1994	
Student library instruction	3	2.39	.0730	

*p< 05

Almost all faculty respondents (98%) indicated that students should receive information literacy instruction. In fact, 87% (30+29+28) reported giving information literacy assignments at least "sometimes." A smaller proportion, not quite two-thirds (10+13+42), reported scheduling bibliographic instruction for their students at least "occasionally." From these data, we [CaN11]conclude that faculty members expect and require both library and information use whether or not students get an organized session with a librarian.

Only 7% of respondents described the information literacy of their students as high and 35% described it as low. Whether faculty members themselves are information literate or not, they agree that few of their students are adequately information literate to complete the research required in their courses. A logical conclusion is that more work is needed to bring student information literacy up to the expectations of college faculty for student success in college courses and later life.

The results demonstrated a trend toward increasing computer literacy on the part of faculty: just 5% of the faculty members felt they were fumbling around with computers while 24% considered themselves experts. As computers and the Internet become firmly established in our culture, faculty members and others spend more time developing their computer skills and confidence. Some college faculty members remain on the leading edge of technology. Computer comfort (ANOVA df=2 F=3.35 p=.0388) was significantly related to the score on the information literacy instrument in this study. A Tukey HSD test indicated information literacy scores were significantly higher for the respondents who perceived themselves as competent computer users than for those who doubted their skills.

The respondents felt more comfortable using computers (24% expert; 5% fumble) than the library (15% expert; 12% fumble). Respondents who were more information literate were more comfortable using an academic library *(*ANOVA *df*=2 *F*=7.01 *p*=0.0014). A Tukey HSD test indicated those who classified themselves as expert or competent library users scored significantly higher scores than those who classified themselves as fumblers at the academic library.

Results indicated 78% of respondents frequently find information on the Internet without becoming frustrated. Finding information is more convenient on the Internet, but faculty members do not always feel competent to find exactly what they need. More than one faculty member mentioned the problem of inundation with material on the Internet and the difficulty in isolating authoritative sources.

Respondents assessment of their overall knowledge of how to conduct library research was significantly related to their information literacy scores (ANOVA df=3 F=6.35 p=.0005). There was a significant difference between the scores of faculty members who described themselves as possessing fair knowledge of how to conduct library research and those who had excellent or good knowledge. Faculty who did poorly on the information literacy test knew their research skills were deficient.

Methods of Providing Information Literacy Instruction to Students

Table 5 shows faculty preferences for providing information literacy instruction to students. Some responses were stereotypical, but others demonstrated an understanding of the issues. Several faculty members echoed the faculty culture philosophy described in Hardesty (1991) when responding to the question of how students should receive information literacy instruction:

- *You mean high schools don't do this?*
- *Mainly they should learn by using the library.*
- *They need to learn through trial and error.*

Students will learn by using the library, but universities are in the business of teaching and providing opportunities for students to develop their skills and knowledge. Effective assignments will encourage students to develop their information skills; whereas, poorly designed or inaccurate assignments will turn students off to the process (Mosley, 1998). Some fundamental procedures and a framework will assist students in getting far enough into the search for information to develop some sophistication before they experiment. With so

much information of inconsistent quality available today, the trial and error method is fraught with problems.

Table 5. Recommended Methods of Providing Information Literacy Instruction to Students.

How should college students receive Information Literacy Instruction?	n	%
Freshman Orientation, freshman year experience, and introductory courses	21	22%
Specialized and required courses	17	18%
Across the curriculum or integrated in all courses	17	18%
In general education classes and writing classes	15	16%
Hands-on in library or computer lab	13	14%
Mandatory	14	15%
Assignments	11	12%
By librarian or library staff	12	13%
Discipline courses	9	9%
Library visit	7	7%
Self-directed online tutorial	5	5%
Cooperatively between professor and librarian	5	5%
High school	2	2%
Tutoring or on demand	2	2%
Learn by using library or trial and error	2	2%
In at least one class each semester	2	2%
Multiple formats	1	1%
TOTAL	155	95
	responses	respondents

Many librarians believe students need to practice their research skills in nearly every course through a variety of activities relating to the topic of the

course and that these activities have to be graded to get students to actually do the work. Several studies (Hardesty, 1995; Sellen and Jirouch, 1984) found students rarely use library resources unless required by an authority figure such as the professor or a librarian.

Librarians would find it disappointing that only 18% of faculty respondents felt information literacy instruction should be fully integrated across the curriculum. Librarians believe information literacy instruction is most effective when it is offered in small chunks over an extended period of time through a variety of means. The same techniques might work for faculty information literacy training as well.

Some faculty described multi-faceted training programs for developing student information literacy since there is no single best way.

- *Part as a general explanation of resources available, part as a search for real materials for a research paper.*
- *Through library orientation course which carries academic credit and in each introductory class in a subject.*
- *Within basic major course curriculum—make it germane to student's area of study.*

Providing students with training and practice in a systematic process of locating, screening, and synthesizing appropriate material for college projects, not only clarifies the steps, but also increases the quality of student projects. If faculty are unaware of and fail to value the student research process, student learning and mastery of information management skills are jeopardized.

Training and practice under the expert guidance of faculty members and librarians working together to design effective assignments and spread accurate information is the key to developing future information-savvy adults.

Faculty Search Strategy Methods

The [am12]search strategy exercise presented respondents with ten blocks in which to list the steps they would take to find information on body piercing. The response rate on this task was 79% with 85 respondents entering one or more comments. The researcher examined all comments for common themes and created a tally template. The researcher counted each reference to any common or unusual theme once. If the respondent referred to more than one theme in a comment, each theme received a tally mark, for a total of 418 points expressed (Table 6). Since searching for information is a recursive process, the order the respondent assigned to the themes was ignored.

Overall, the respondents demonstrated a strong grasp of information literacy concepts. With the task of finding information on such a popular topic, it was encouraging that 98% (n=83) of those who answered the question would search at one or more Internet search engines. Many respondents mentioned their favorite search engine and 73% (n=62) stated exactly what they would type into the search box. Perhaps attendees do not retain the jargon used by librarians. Then again, 28% of faculty members would generate keywords before beginning their search, which is another step in the search process librarians emphasize.

Table 6. Faculty Search Strategy Methods.

How would you find information on body piercing?	**n**	**%**
Internet search engine (e.g., Google, Yahoo, Lycos, Dogpile, NL, MSN, Metacrawler)	83	98%
Construct appropriate search terms	62	73%
Library print resources (e.g., reference collection, books, magazines, indexes)	48	56%
Online databases (e.g., ProQuest, FirstSearch)	34	40%
Library catalog and website	31	36%
Talk to friends/relatives with piercing; call businesses; interviews	27	32%
Generate keywords	24	28%
Screen or evaluate results	22	26%
Articles (includes magazine, journal, and newspaper)	22	26%
Refine search based on results	20	24%
Medical sources	12	14%
Wouldn't look for this information	11	13%
Skim articles and items for other sources	10	12%
Depends on information need	6	7%
CD-ROM database	3	4%
Boolean search	1	1%
Personal collection	1	1%
Request assistance from librarian or library staff	1	1%
TOTAL	418	85
	responses	respondents

Over a third of the faculty members would check the library catalog and website and online databases for authoritative sources on the topic. In addition to the Internet search, 56% (n=48) of the respondents would check at the library for traditional resources, such as books, reference materials, magazines, and indexes to track articles. A quarter of the respondents would look for magazine

and newspaper articles while 14% would search for medical sources. Since body piercing could be approached from a variety of perspectives, the low rate of use of medical resources was appropriate.

Only a quarter of the respondents would consider the purpose of the information need before beginning the search—a difficult concept for novice researchers to grasp. This result was a disappointment since a full understanding of the purpose of the information search directs the entire process.

- *Depends on what the purpose of the information was: research paper or personal consumption.*
- *Decide what I was going to do with the information—paper, speech, editorial—and determine the audience and the scope of my "project."*

Respondents mentioned a variety of non-library information sources that librarians and faculty members struggle to get college students to consider. Almost a third of the respondents would call and/or interview people with piercing, businesses, doctors, or the Better Business Bureau.

- *Call businesses offering body piercing and interview proprietor.*

Several comments revealed a need for more up-to-date training. Since most academic libraries have phased out CD-ROM databases in favor of 24-hour, remote access to the same products on the Internet, the three respondents who mentioned CD-ROM databases would benefit from an update on current information systems and services. The same would be true of respondents who would look for articles in print indexes. One respondent mentioned *Reader's Guide to Periodical Literature*, which is available online unless one were

researching materials created over 20 years ago. Another respondent would have benefited from learning how to eliminate commercial websites from an Internet search. Yet, another respondent would benefit from greater familiarity with current library services. Since the library cannot afford to purchase all the books published on any given topic, a free interlibrary loan service obtains within one to two weeks books not in the library's collections. Finally, another faculty member had an excellent solution for locating the books not available in the library or through the interlibrary loan service—amazon.com or bn.com.

- *I'd probably search the web generally last since body piercing is now a big deal and I'd just get ads for tattoos.*
- *Search for identified books in the library; sigh over books not held; note subjects in index.*
- *Search online bookstores for books addressing body piercing.*

Several comments echoed the existing literature on faculty attitudes toward librarians and information literacy. The independent researcher (Hardesty, 1991; Leckie, 1996) does not require assistance from a librarian or library staff. In this study, only one faculty member would approach library staff for assistance. As a scholar in the field, one respondent would consult resources within his or her personal collection.

- *I would go through the materials I found, review the sites, and look at the bibliographies.*

Approximately a quarter of the respondents mentioned the most important problem confronting those who search for information, especially on the Internet--refining a topic and evaluating sources retrieved.

- *Based on this response, I may narrow the search down using body+piercing or expand it with just "piercing."*
- *You will experience information overload on this topic. Thus, you will have to narrow it down to something more specific about body piercing.*
- *Review information and look for answers and gaps in information.*

A small (13%), but outspoken, set of respondents admitted they would not undertake a search for information on body piercing. An interpretation of this response might be that faculty members never have to look for information on a topic that does not interest them. Nevertheless, faculty members ask students to research a new topic, so the student will learn about it. The need to locate and analyze information on a topic outside their personal interests for employment or other purposes is why students benefit from learning a process to approach the collection and analysis of information.

- *I don't care about body piercing, so I would not spend my time on it. I'd simply state my opinions.*

Methods of Improving Faculty Information Literacy

Since faculty members want students to receive information literacy instruction (98%) and want the same training for themselves (96%), the key question is how to provide that training most effectively. Table 7 indicates the recommendations of the respondents to this study. Faculty at the University

Centers of SUNY told Adams and Bonk (1995) that lack of training and knowledge about electronic resources was a key barrier to their use of information. Adams and Bonk found faculty prefer small group classes and workshops, printed manuals, and online tutorials as training mechanisms for electronic information resources. In the Adams and Bonk study, faculty listed formal classes as the least desirable method of instruction.

Faculty may embrace web tutorials as techniques to learn information management skills because they are available when, where, and for as long as the faculty member needs the tutorial. There is no intermediary. Library, computing, instructional technology, or faculty development personnel may provide appointment or drop-in support. Training sessions at the department or discipline are convenient and provide for greater focus on appropriate resources (Amstutz & Whitson, 1997). Nevertheless, the optimal atmosphere may backfire when strong-minded, busy people are forced to place their technological expertise on display in front of their peers.

Multiple techniques will probably be the most effective. Academic libraries and librarians will have to be creative to find ways to keep faculty in different disciplines with different learning styles or preferences informed of changes in the services and systems and confident of their abilities to interact with those services and systems (Breivik, 1998). Some of the combinations of training options mentioned by respondents to this survey include:

- *Short 1-2 hour courses during the semester or during faculty professional development days.*

- *Hands-on workshops; one-one tutelage; "how to" module available online.*
- *Web-based courses for new technology plus workshops for departments; web lessons for each database.*

Table 7. Recommended Methods of Providing Information Literacy Instruction to Faculty.

How should Faculty receive Information Literacy Instruction?	**n**	**%**
Short courses, workshops, or seminars on various topics	34	36%
Mandatory in-service or professional development	17	18%
From professional librarians or library staff	11	12%
Self-directed online (web-based) tutorials	10	11%
Appointment, on demand, or one-on-one meetings	10	11%
Voluntary	8	9%
Department level or discipline specific training	6	6%
Annual	5	5%
Intensive hands-on training in a computer lab	3	3%
Multiple approaches	3	3%
Faculty will resist	3	3%
Orientation	3	3%
No idea or had never thought about it	2	2%
Email listserv	1	1%
Paid for adjunct	1	1%
Printed help	1	1%
Instructional technology department of university computing	1	1%
Assess needs and fill them	1	1%
TOTAL	120	94
	responses	respondents

Conclusion

This study indicated that faculty members who visit the library frequently, feel comfortable in the library, feel comfortable with computers, and have a strong overall ability to conduct research are the most information literate. If college faculty develop and maintain their own information literacy skills, they are more likely to require their students to master the same set of skills (Leckie & Fullerton, 1999). Faculty members need to update their information skills frequently to succeed at research in their own discipline, as well as to teach effectively (Breivik, 1998). However, librarians face difficulty in getting faculty to participate in instructional and sharing efforts.

Librarians should be open to developing their teaching skills, enacting faculty suggestions for the types of training they want, assessing their information literacy programs, working with other groups within the university, being visible on campus, and collaborating with faculty and administration. Carefully implemented outreach efforts that involve establishing personal relationships with individual faculty members and offering to work on team teaching or assignment development together may be the best solution (Kotter, 1999).

Faculty culture (Hardesty, 1995), use of a different research method from that of students, and resistance to assistance from librarians hinders full integration of information literacy into college courses and across the campus. Faculty members could improve their own information literacy and that of their students if they embraced support opportunities; attended workshops on how to design assignments to help students develop their information literacy skills in

general and for discipline-specific courses; and worked together with librarians and other campus groups (Iannuzzi, 1998).

This sample of college faculty was information literate; however, recalcitrant and technophobic faculty were unlikely to respond to the email requests to participate. If librarians and other faculty reach out to these reluctant faculty members, students will benefit.

This study is a beginning and indicates the need for further examination of the state of faculty information literacy and factors associated with it. Studies involving a nationwide sample and a more rigorous research design would contribute to a developing body of knowledge on this pivotal topic.

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